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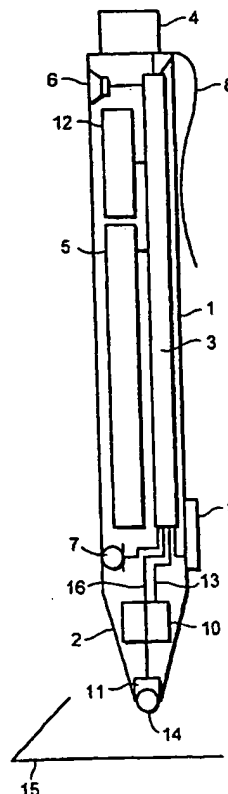
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(54) **Mobile radio telephone**

(57) The invention relates to a method for inputting information into a mobile radio telephone (1) via its input data channel by appropriately moving a motion detector (10) which belongs to the radio telephone (1) and senses this movement. In this arrangement, the mobile radio telephone (1) can be constructed to be pen-shaped and can contain the motion detector (10) in its pen point.



**FIG. 1**

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### Description

**[0001]** In the field of mobile communications, subscribers now expect ever smaller and lighter radio telephones which they can carry with them at all times and which, in addition, are easy to operate.

**[0002]** At present mobile radio telephones usually have a numeric keypad for inputting directory numbers but also for inputting characters in order to store, for example, the name of a subscriber with the associated directory number. Later, the name of the subscriber is retrieved from the memory of the telephone and the associated directory number is automatically dialed.

**[0003]** Furthermore, it is possible in today's radio telephone networks to send short messages via the so-called Short Message Service (SMS). These short messages are input via the numeric keypad which, for this purpose, is set to a mode which makes it possible to input letters.

**[0004]** In addition to the usual numeric keypad, mobile radio telephones also have some additional function keys and a menu structure, for example to facilitate the selection of the name of a stored subscriber. In the final analysis, however, utilization of the functions described above with the usual keypads remains extremely difficult and cumbersome.

**[0005]** As the miniaturization of mobile radio telephones increases, however, the usual keypad will also no longer be suitable for carrying out the functions described above. This is known, for example, from pocket calculators integrated in wrist-watches which can now only be operated with the point of a pen or similar objects.

**[0006]** To facilitate at least the selection of directory numbers from a memory, today's mobile radio telephones are equipped with a small hand wheel or with multi-function keys which, however, do not provide any help when inputting words.

[0007] A mobile phone which is constructed in the form of a pen and which has a digit input unit in which the digits are preselected by rotating the pen point and selected by pressing a button is already known from DE 42 94 697 C2. The mechanical structure of this mobile telephone is quite complicated and therefore susceptible to faults. In addition, a large amount of time is needed for inputting information.

**[0008]** Last but not least, a dictating pen for deaf/mute persons is known from JP 7-271 293. The dictating pen contains in its point an acceleration sensor device which detects the movement of the pen and converts characters written with it into language. The electrical voice signals can also be coupled into a telephone line, either directly or via a microphone connection of a microphone present in a telephone handset.

**[0009]** The invention is based on the object of simplifying the inputting of information and making it more flexible with respect to the type of information which can be input even in mobile radio telephones which are minia-

turized further.

**[0010]** In the method according to the invention, information is input into a mobile radio telephone via its input data channel by appropriately moving a motion detector which belongs to the radio telephone and senses this movement.

**[0011]** Mobile radio telephones usually have an acoustic channel via which information spoken using a microphone can be input into the telephone. In addition, there is an input data channel via which information can be input into the telephone, for example by keys or other mechanical input means. The invention makes use of this input data channel for additionally transmitting signals from the motion detector via it, which makes it possible to increase the range of data to be input with respect to their type and, by using the motion detector, to save a large number of input keys so that it is possible not only to simplify the inputting of information via the input data channel but also, by saving input means, to enable the mobile radio telephone to be miniaturized further.

**[0012]** Any information which can be represented graphically by moving the motion detector can be input via the input data channel. This can be letters, digits, symbols, lines or other graphic elements or figures or technical representations composed of these.

**[0013]** The information input in this manner can be used for a wide range of purposes. For example, it can be input for carrying out dialling processes, for the transmission of short messages or longer texts to a subscriber or even for transmitting entire technical representations or tables, the information transmitted to the subscriber then being displayed there, for example on a suitably constructed monitor or can be output via a printer, for example. In this case, the monitor could be present, for example, in a mobile communication device which is equipped with telephone functions whilst the printer, for example, could be that of a facsimile machine equipped with telephone functions.

**[0014]** According to one embodiment of the invention, the entire radio telephone, and with it the motion detector, is moved for inputting the information. In contrast, according to another embodiment of the invention an input device belonging to the radio telephone and accommodating at least the motion detector can be moved for inputting the information. Both options allow the information to be input in a particularly simple manner and thus lead to very good manageability of the telephone.

**[0015]** The information input in this manner can in principle be transmitted as it is from the telephone to the subscriber. However, it is also possible to compare the input information with information already present in the radio telephone for recognition of the input information. This variant is selected especially if a dialling process is to be carried out via the input information or if it is intended for transmitting short messages in text form or longer texts. In this case, greater reliability with respect to the correctness of the information input or transmitted

is achieved.

[0016] The information input or recognized can also be temporarily stored in the radio telephone in a further development of the invention. With respect to the input information, this applies, for example, to graphic representations which are first generated by the input process and are stored in a buffer memory before the stored data are sent to the receiver, for example in packet form. With respect to detected information, this applies, for instance, to input telephone numbers which are first temporarily stored before a dialling process can be initialized.

[0017] On the other hand, information input or recognized can naturally also be transmitted on-line, although in some cases this may require more transmitting time, especially where drawings are transmitted.

[0018] If information is input via the input device which is separate from the rest of the radio telephone, the information can be transmitted from the said device to the rest of the radio telephone via a cable or via a radio link in order to be transmitted from there to the subscriber, possibly after further processing. During this process, the information input or recognized can be displayed by the radio telephone itself or in the case of the two-part construction, by the input device or the rest of the radio telephone. A user can therefore check the input information with respect to its correctness.

[0019] To ensure reliable operation of the radio telephone, it can be switched to an information input mode which is selected from a menu by operating a selection device for inputting information. In this connection, predetermined characters input in the information input mode can be used for grouping input information. Thus, input digits can be assembled into complete telephone numbers, characters into character groups, letters into words and drawing elements into a graphic representation or technical drawings.

[0020] According to an advantageous embodiment of the invention, accelerations in different directions are measured by the motion detector for inputting information. This detector can exhibit sufficient acceleration sensors to sense movements in one plane or movements in space. Advantageously, therefore, two or three acceleration sensors, respectively, which measure accelerations in mutually perpendicular directions are used in the motion detector. The input information can be deduced from the measured accelerations, appropriate algorithms being available for this purpose. If it is intended, for example, to input characters (letters or digit), these algorithms, which are generally known, ensure unambiguous recognition of the characters irrespective of which hand a user is using for guiding the telephone or the input device or how the telephone or input device are held in space. If necessary, the radio telephone can be informed in a preparatory step where left and right are located, as an orientation aid, namely by drawing an appropriate line and temporarily storing the corresponding acceleration vector. Recessed cups for the fingers

can also be of assistance for orientating the writing position of the telephone.

[0021] Naturally, a radio telephone of the type according to the invention must also know the point from which movements are to be interpreted as information to be input so that it does not continuously record every movement. For this purpose, appropriate initialization means can be present, especially in the motion detector equipped with acceleration sensors, for example a switch at the point of the radio telephone or the input device which is operated by placing it on a base and thus signals that information input thereafter is to be regarded as useful information. This switch could also be activated by a voice command.

[0022] In a further embodiment of the invention, the motion detector can also measure distances travelled by it in different directions on a base for inputting information. This distance measurement can be carried out by means of a roller ball such as is used, for example, in computer mice. It is also possible, however, to perform the distance measurement by optically scanning lines present on the base by means of a transmitter and a number of receivers. If lines extending in different directions exhibit information about these directions, for example different colours, a position can be determined and thus a distance measured by counting the respective lines in the different directions. The measured distances can in this case, as in the case of detection by means of a roller ball, then be processed by suitable algorithms in order to reproduce the input information electronically. In this connection, character recognition programs can also be used in order to be able to recognize unambiguously, for example, input digits or letters.

[0023] According to the invention, a mobile radio telephone contains a motion detector for inputting information represented by movement of the motion detector via the input data channel of the telephone. As already mentioned, the telephone can be constructed in one part in order to obtain a compact unit. However, it can also comprise an input device which is separate from a main telephone unit and in which the motion detector is accommodated. In this arrangement, radio telephone or input device can be constructed in the form of a pen, leading to an extraordinarily miniaturized model of a radio telephone. If the input device is also equipped with loudspeaker and microphone, it can be used as a voice communication unit and can communicate with the main telephone unit via a cable or cordless link like infrared, radio or ultrasonic link.

[0024] As already mentioned, the mobile telephone according to the invention can contain a character recognition device for recognizing information by comparing the input information with information already present. The recognition device is for example able to recognize characters (letters and numbers) and symbols. Also signs patterns and signatures stored by the user can be recognized. The character recognition device may be activated in a particular operation mode to

number".

[0049] In order that the recognition device recognizes that a number, for example a directory number, will be input next, the user first inputs the symbol "[" by writing this symbol onto a base or copying it in space, depending on the embodiment of the motion detector, with the aid of the telephone or input device which is constructed to be pen shaped. The recognition device recognizes this symbol and forwards the information to the central controller or the processor which now knows that a directory number to be dialled will be input next.

[0050] The user now successively writes each individual digit of the directory number to be dialled by using the telephone in the manner of a pen.

[0051] Each recognized digit is forwarded by the recognition device 21 or 58 to the processor, which causes this digit to be displayed on the display 5 and/or 54, so that the user knows what digit has been input last in this manner.

[0052] After all the digits have been written or input, the user writes the symbol "]". The recognition device forwards this symbol to the processor 17 or 43, which concludes from this that the input process has been completed.

[0053] The user gets back into the menu by a further prolonged operation of the key 9.

[0054] The key 9 is now operated briefly in each case until the menu item "dial numbers" is reached. A long operation of the key 9 then causes the processor 17 or 43 to establish a connection to the radio telephone network via the RF transceiver device 30, 32 or 50 and to set up the connection to the corresponding subscriber via this network.

[0055] To terminate the connection after a call has ended, the key 4 can again be operated.

[0056] In some cases the processor 17, 43 may automatically recognize that when the symbol "]" is input, the inputting of a number has ended, with the result that it can automatically initiate the setting up of a connection to the subscriber without the user having to return to the menu.

[0057] In the text which follows, another illustrative use will be explained with reference to Figure 4. This is the storage of a directory number with associated name.

[0058] Firstly, the abovementioned steps are repeated up to the step in which the symbol "]" is input. The key 9 is now operated briefly in each case until the menu item "store number" appears. After that, the number is stored by prolonged operation of the key 9 and "input name" appears on the display 5 and/or 54. The telephone has now automatically selected the function "input characters".

[0059] The user now starts to input characters by writing the symbol "(" and successively inputs each letter of the required name. After recognition by the character recognition device 21 or 58, the letters are automatically displayed on display 5 and/or 54.

[0060] Finally, the user inputs the symbol ")" so that

the processor, after recognising and processing this symbol, automatically stores the name with the previously entered directory number in memory 19 or 52, of the mobile radio telephone 1 or 37.

5 [0061] For the case of dialling a stored directory number by using a stored subscriber name, there is the option of menu selection or the option of written input.

10 [0062] In the case of menu selection, the user activates the radio telephone by pressing the switch 4 and works through the menu in each case by briefly operating the key 9 until, for example, the display "select name" appears. Long operation of the key 9 gets the user into this menu item and he can work through memory 19 or 52, by briefly operating key 9, until the desired name appears. Long operation of key 9 then automatically dials the associated directory number and the connection is established.

15 [0063] In the case of written input, the user again activates the telephone by pressing the switch 4 and works through the menu in each case by briefly operating the key 9 until the menu item "input mode" appears. Long operation of the key gets the user into this input mode and he can enter the letters of the name after inputting the symbol "(" . This, once again, is done by a writing process in which the pen-shaped telephone is held and guided in the manner of a writing pen. After the input has been ended by inputting the symbol ")", the user again keys through the menu by in each case briefly operating the key 9 until the display "select name" appears. Key 9 is now pressed for a relatively long time and the input name is then searched for in memory 19 or 52 and, in the case of a success, a connection is established to the associated directory number.

20 [0064] Functions such as sending a short message and similar can be executed in the same manner as the functions described here. In particular, inputting the symbol "<" allows the function "input graphics" to be selected so that figures or technical representations can now also be temporarily stored in the memory 19 or 52, by appropriately moving the radio telephone. After the symbol ">" has been input, another menu item, for example one in which the temporarily stored drawing is transmitted to another subscriber, can then be selected by in each case briefly operating the key 9.

25 [0065] Figures 5 and 6 show a third and fourth illustrative embodiment of a radio telephone 1', 1". These are again one-part embodiments according to the embodiment of Figure 1, so elements identical in Figure 1 are provided with the same reference symbol and will not be described again.

30 [0066] Motion detector 10 and switch 11 in the illustrative embodiment of Figure 1 are replaced by a travel measuring device 62 equipped with a roller ball 61 in the third illustrative embodiment according to Figure 5. This can be a travel measuring device with roller ball such as is used, for example, in computer mice. With this device, travel measurements are possible in two mutually perpendicular directions when the roller ball 61 is rolled

along a base. The corresponding measured signals are transmitted via a line 63 to the electronic circuit 3 and evaluated by the recognition device 21 according to Figure 2 in order to be able to recognize written characters or other symbols or graphics. In this arrangement, the roller ball 61 can also be elastically supported in order to operate a switch present in the travel measuring device 62 when it is placed onto the base 15 in order thus to transmit an identification signal for beginning character recognition via the switch to the electronic circuit 3 via a line 64.

[0067] In the fourth illustrative embodiment according to Figure 6, there is an optical sensor device located in the point of the radio telephone 1". This optical sensor device consists of a centrally positioned transmitting device 65 for sending out light in the direction of the base 15 and of two optical receivers 66 and 67, arranged laterally thereto and having different spectral sensitivities. Located on the base 15 are respectively parallel lines 68, 69 which are relatively close together and extend in two mutually perpendicular directions. Lines 68, 69 have a colour matching the receiving characteristic of the optical receivers 66, 67 so that the lines can be counted directionally selectively when the radio telephone 1" is moved over the base 15. In this manner, it is possible to measure the distance travelled by means of the respective counts in order to be able to carry out a recognition on the basis of these measured values. This is again carried out in the recognition device 21 of Figure 2. The signals output by the optical receivers 66, 67 are conducted via a conditioning circuit 70 and furthermore via a line 71 to the electronic circuit 3. The conditioning circuit 70 also supplies power to the transmitting device 65.

[0068] In deviation from the illustrative embodiments 5 and 6, it is naturally also possible to accommodate the respective motion detector devices in an input device according to Figure 3.

#### Claims

1. Method for inputting information into a mobile radio telephone (1; 1'; 1"; 37) via its input data channel by appropriately moving a motion detector (10; 61, 62; 65 to 67) which belongs to the radio telephone and senses this movement.
2. Method according to Claim 1, characterized in that the entire radio telephone is moved for inputting the information.
3. method according to Claim 1, characterized in that an input device (38) belonging to the radio telephone and accommodating at least the motion detector is moved for inputting the information.
4. Method according to one of Claims 1 to 3, characterized in that the input information is compared with

information already present in the radio telephone for recognizing information.

5. Method according to Claim 4, characterized in that the information input or recognized is temporarily stored in the radio telephone.
6. Method according to Claim 4, characterized in that the information input or recognized is transmitted on-line.
7. Method according to one of Claims 4 to 6, characterized in that the information input or recognized is displayed by the radio telephone.
8. Method according to one of Claims 1 to 7, characterized in that the radio telephone is switched to an information input mode which is selected from a menu by operating a selection device (9) for inputting information.
9. Method according to Claim 8, characterized in that predetermined characters input in the information input mode are used for grouping input information.
10. Method according to one of Claims 1 to 9, characterized in that accelerations in different directions are measured by the motion detector (10) for inputting information.
11. Method according to one of Claims 1 to 9, characterized in that the motion detector (61, 62; 65 to 67) measures distances travelled by it in different directions on a base (15) for inputting information.
12. Method according to Claim 11, characterized in that the distance measurement is carried out by means of a roller ball (61).
13. Method according to Claim 11, characterized in that the distance measuring is carried out by optically scanning lines (68, 69) present on the base (15).
14. Mobile radio telephone (1; 1', 1"; 37) having a motion detector (10; 61, 62; 65 to 67) for inputting information represented by movement of the motion detector via the input data channel of the telephone.
15. Mobile radio telephone according to claim 14, characterized in that it is constructed in one part.
16. Mobile radio telephone according to Claim 14, characterized in that it exhibits an input device (38) which is separate from a main telephone unit (39) and the motion detector is accommodated in the input device (38).
17. Mobile radio telephone according to one of Claims

- 14 to 16, characterized in that the motion detector (10) comprises a number of acceleration sensors for measuring accelerations in different directions.
18. Mobile radio telephone according to one of Claims 14 to 16, characterized in that the motion detector comprises a roller ball (61) for measuring the distances travelled by it in different directions on a base. 5
19. Mobile radio telephone according to one of Claims 14 to 16, characterized in that the motion detector comprises an optical transmitting/receiving device (65 to 67) for the directionally selective scanning of lines (68, 69) present on a base (15). 10 15
20. Mobile radio telephone according to one of Claims 14 to 19, characterized in that it itself or the input device comprises a switch (11, 14) and that when this switch is operated, the information generated by movement of the motion detector can be processed as such. 20
21. Mobile radio telephone according to Claim 20, characterized in that the switch can be activated by way of sound. 25
22. Mobile radio telephone according to Claim 20 or 21, characterized in that the switch (11, 14) is located at a point (2) of the telephone or of the input device (38). 30
23. Mobile radio telephone according to one of Claims 15 to 22, characterized in that it itself or the input device is constructed in the form of a pen. 35
24. Mobile radio telephone according to one of Claims 14 to 23, characterized in that it itself or the input device comprises a selection device (9) for selecting an operating mode in which the information generated by moving the motion detector can be input. 40
25. Mobile radio telephone according to one of Claims 14 to 24, characterized in that it contains a recognition device (21, 58) for recognizing information by comparing the input information with information already present. 45
26. Mobile radio telephone according to one of Claims 15 to 25, characterized in that it itself or the input device is equipped with a display device (5; 54) for displaying the information generated by moving the motion detector or the recognized information. 50
27. Mobile radio telephone according to one of Claims 15 to 26, characterized in that the input device (38) communicates with the main telephone unit (39) via a cordless link (41). 55
28. Mobile radio telephone according to claim 27, characterized in that the information input during the movement of the motion detector is transmitted to the main telephone unit (2) via this cordless link.
29. Mobile radio telephone according to Claim 27 or 28, characterized in that the input device (38) is equipped with loudspeaker and microphone in order to be able to transmit sound signals via the cordless link (41).

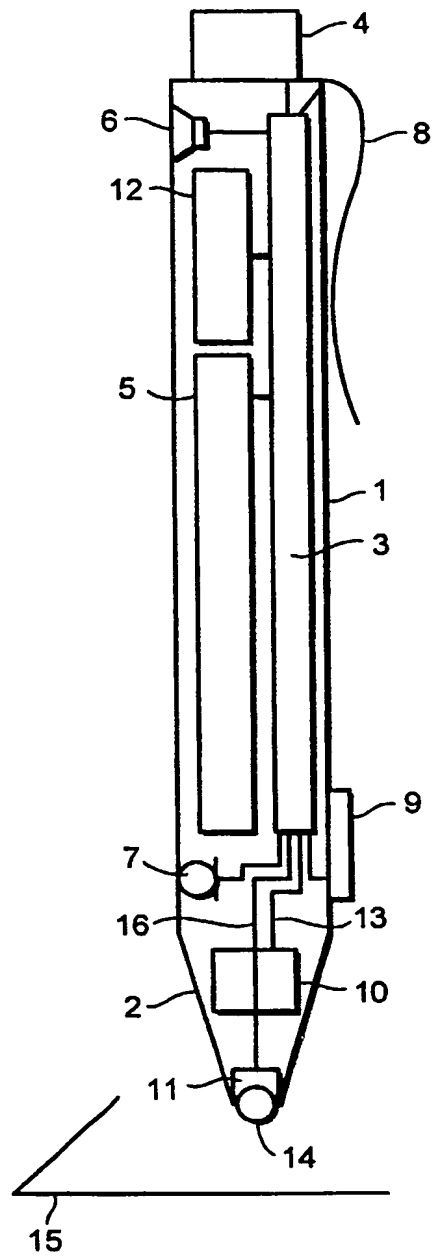


FIG. 1

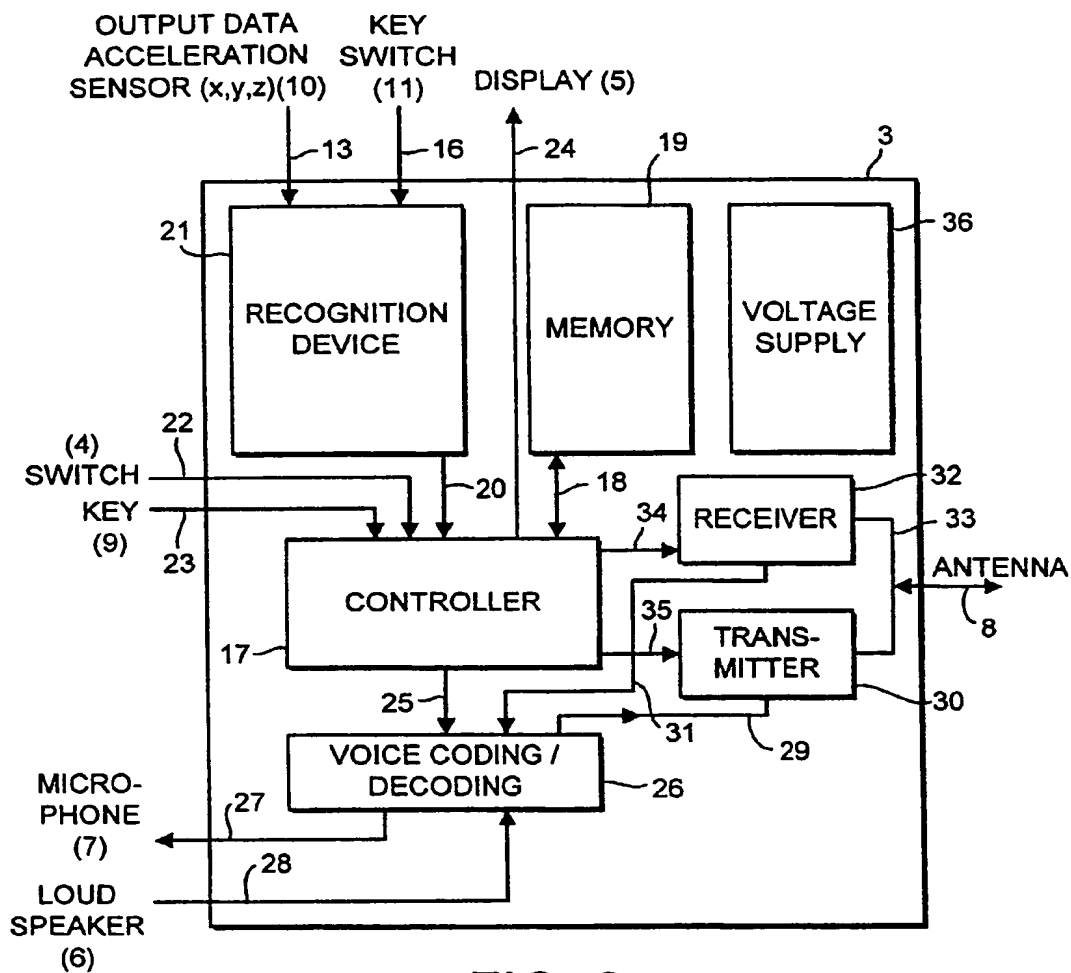


FIG. 2



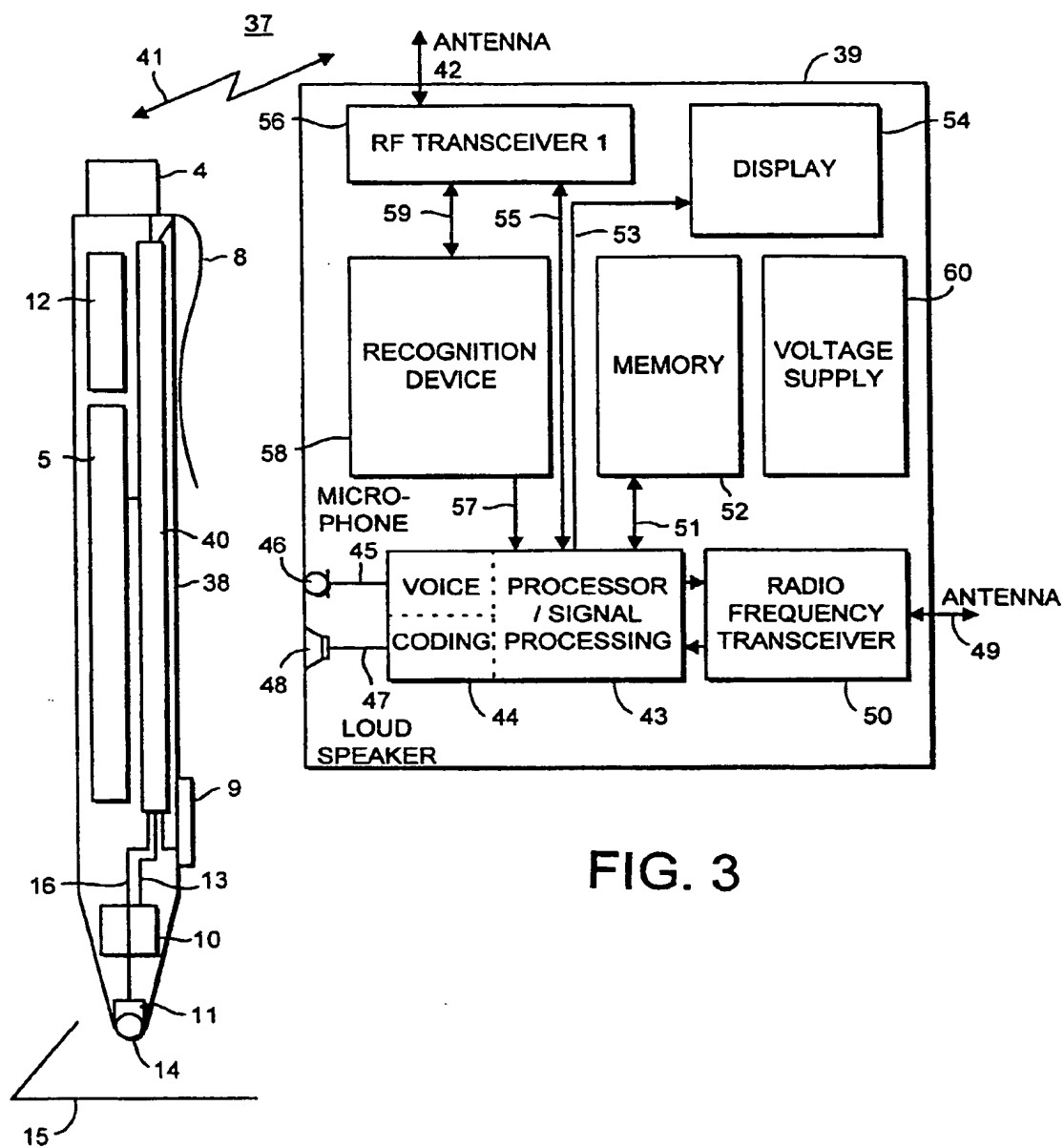


FIG. 3

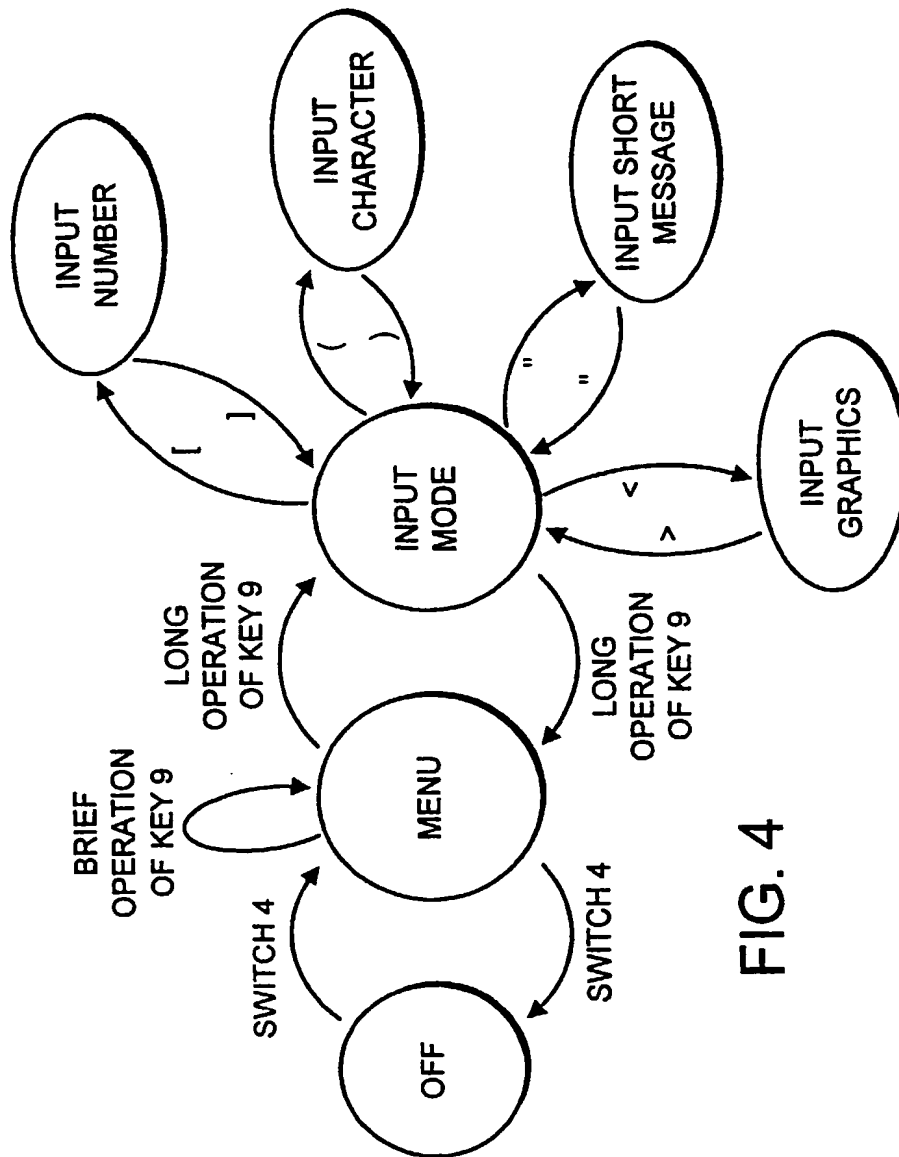


FIG. 4

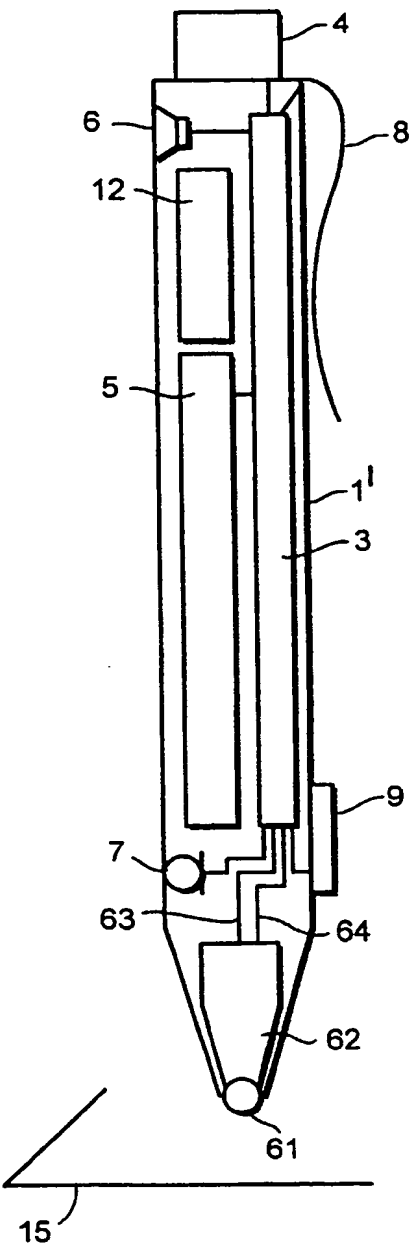


FIG. 5

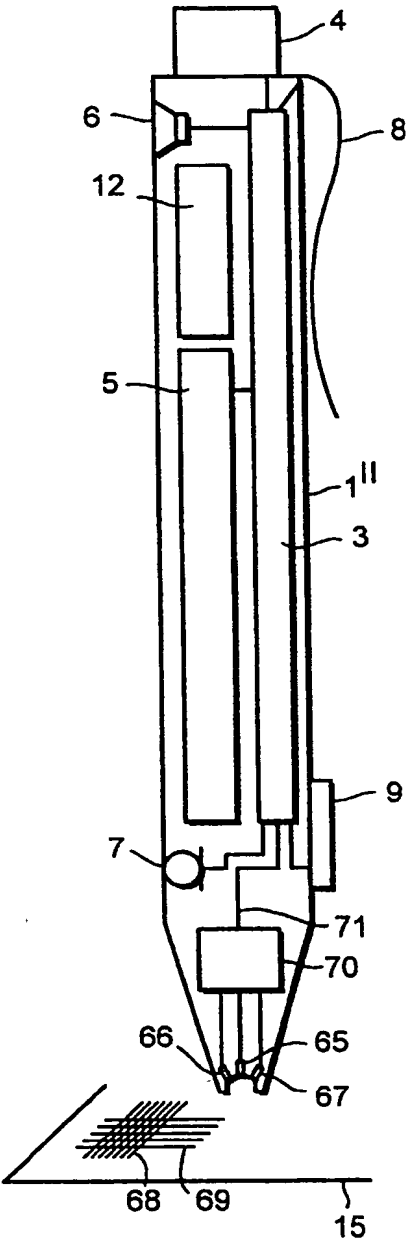


FIG. 6